Reading Can Slow the Progression of Alzheimer's Disease

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Introduction

Reading is a mentally stimulating activity that creates neurological connections within the brain (Watkins, 2012). It is a highly benefitical activity for brain health (Siemasko, 2014). The majority of people learn to read at a young age. We are taught how to read in school and we begin with the basics; learning the alphabet. We start by memorizing the letters and the sounds each letter makes. Beginners start by decoding one-syllable words and work our way up to words with multiple syllables (Kelly, 2017).

How does reading happen in the brain?

When we look at how reading works in the brain, first we need to understand how the brain functions specifically to reading.

Temporal Lobe

Processes auditory perception and decodes sounds (Lewis, 2016). The hippocampus is located in the medial temporal lobe and is a critical region that stores memory and memory function (Burns, 2012). While were reading, we access this part of the brain which reminds us how to pronounce each letter in a word. Since our brain is constantly processing information, it seems like second nature; we are often reading and decoding words without even realizing it (Burns, 2012).

Parietal Lobe

The parietal lobe processes language, and also works in conjunction with the temporal lobe and hippocampus to recognize words and turns letters into words (Lewis, 2016). All of these areas are stimulated while a person is reading (Watkins, 2012).

Frontal Lobe

This area manages speech, grammatical usage, comprehension, and reading fluency. We use this part of the brain in conjunction with the parietal lobe to understand language (Lewis, 2016).

Occipital Lobe

Located in the posterior cerebral cortex, which is the back of the brain (Watkins, 2012). The occipital lobe works with the frontal lobe when a person is reading words aloud; by visually seeing the word in the occipital lobe, and pronouncing and comprehending it in the frontal lobe (Burns, 2012).

Diagram of Brain Lobes

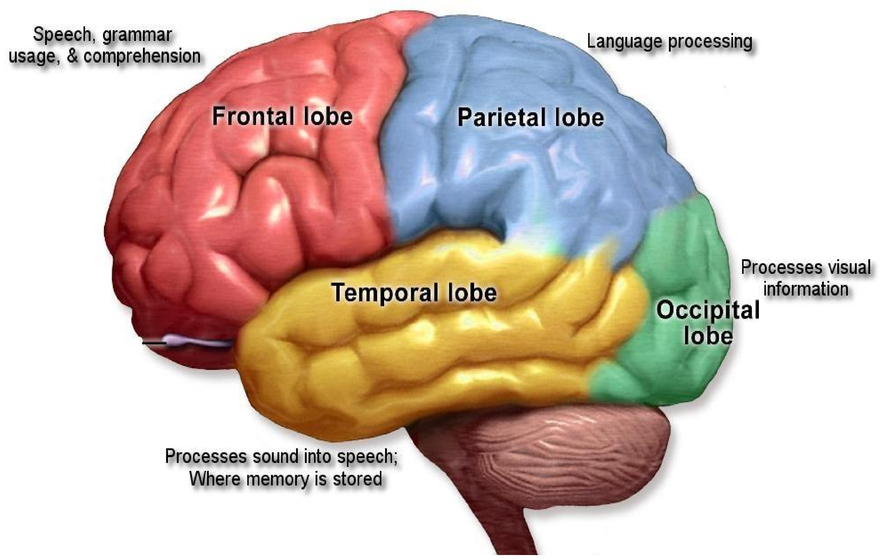


Figure 1. Diagram of Brain Lobes. Each lobe of the brain and its function is labeled; red- frontal lobe; blue- parietal lobe, green- occipital lobe, yellow- temporal lobe. Reprinted from Blaus, Bruce, February 11, 2014. Brain Lobes [Diagram of Brain Lobes; Figure 1]. Retrieved from https://commons.wikimedia.org/wiki/File:Blausen_0111_BrainLobes.png

The Neuron

Each time something new is read, physical changes in the brain occur by creating new neurological pathways; this improves each function of the four lobes and the hippocampus (Burns, 2012). There are between 100 million and 100 billion neurons in the human brain. Neurons are tiny cells in the brain that transmit information back and forth. There are five major parts of the neuron that we will focus on:

Nucleus

Stores information within the cell body

Cell body

Holds the nucleus and is apart of the pathway an electrical impulse travels

Axon

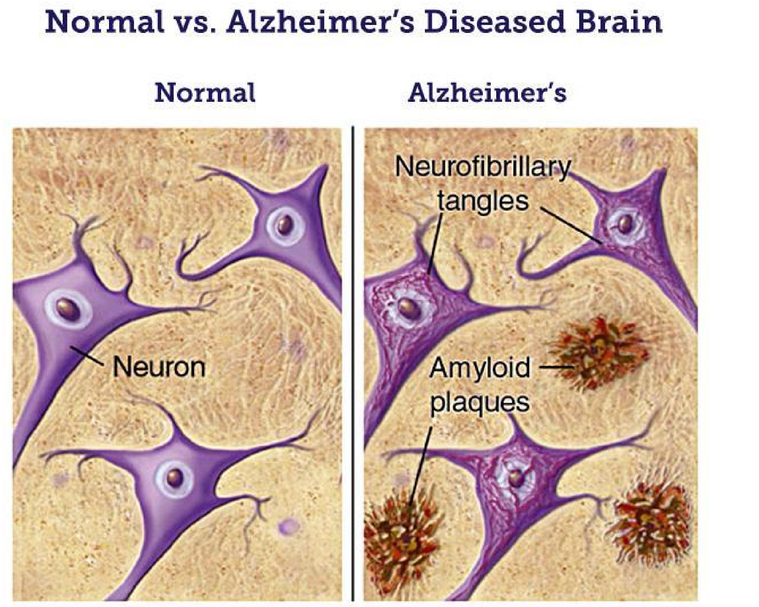
Long projection from the cell body that connects to the axon terminals, also the pathway the electrical impulse travels

Axon Terminals and Dendrites

Sends ands receives messages from the next neuron

Alzheimer's disease is the most common form of dementia effecting 60-80% of all cases (Alzheimer's & Dementia, 2016). It is caused by abnormal deposits of proteins in the brain called beta-amyloid plaques and neurofibrillary tangles. It is also accompanied by the loss or damage of connected neurons used to transmit messages throughout the brain (Colbert, 2016).

Alzheimer's Disease



Beta-Amyloid Proteins

These proteins, also called plaques, travel freely throughout the brain until they begin to cluster together (Goldman, 2013). They attach to nerve cell specifically to the synapses (or empty space) between neurons. They block messages being sent back and forth (Colbert, 2016).

Neurofibrillary Tangles

This is the other protein found in the brain, formally called tau. Tau binds together to form tangles that block a neuron's transportation within the brain. The neuron begins to deteriorate while synaptic signaling is lost. When the neurons die the brain begins to shrink, this process is called atrophy. Significant atrophy is found in a person in the most server stage of Alzheimer's disease.

Influence of Reading on the Brain

Finding a book that is both mentally stimulating and pleasurable can be a huge benefit in creating connections within the brain. Exercising your brain is much like exercising your body in that continually finding new ways to test your limits will increase your strength. Since reading activates multiple parts of the brain, and creates new connections between neurons; then a person who has Alzheimer's disease could use reading as a tool to slow the progression of their disease. While plaques and tangles block and destroy connections, reading creates new connections. This could counter the effects of Alzheimer's disease and bring back cognitive ability that was once threatened.

Acknowledgments

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